

CLARREO Goals (Solar Portion)

- To enable rigorous detection of decadal climate change in the key climate variables that are remotely sensed by satellites.
=> e.g., solar irradiance, cloud & aerosols properties, radiation budget, vegetation, ocean color, snow & ice.
- This science will be achieved by using CLARREO as an orbiting calibration standards laboratory designed and optimized for calibration of sensors on operational and research missions which will then provide the global space/time sampling needed for climate change detection.
- CLARREO will provide the SI traceable accuracy in orbit for these sensors at absolute accuracy levels sufficient to observe decadal climate change at a signal-to-noise level of at least 5:1 (Ohring et al., 2005).

References:

- Multi-agency report the Nov 2002 workshop on satellite calibration requirements for climate change (Ohring et al., 2005, NISTIR 7047).
- GCOS 2006 satellite calibration report.
- Recent ASIC³ workshop report on methods to achieve this calibration.

CLARREO Spectral, Spatial, Angular, and Temporal Sampling Requirements (Solar)

Category	Requirement	Req'd Further Studies
Spectral	0.38-2.5 mm (5-10 nm spectral resolution, sampled to ~25% of spectral res); Characterize solar measurement instrumentation for polarization	<ul style="list-style-type: none"> - Convolve spectra over inst SR (e.g., MODIS) vs accuracy requirement. - Accuracy requirement as a function of wavelength. - Clarify polarization requirement
Spatial	~1 km IFOV resolution over 100-km swath; Avg over 100-km regions for intercalib. with other instruments	<ul style="list-style-type: none"> - Scene simulation study for IFOV (e.g., land applications).
Angular	0-70° with full azimuth range; Ability to view the moon (phase angles 5° to 90°)	
Pointing capability	~2° per sec; Pointing control of 0.5°*; Pointing knowledge: 0.5 arc min (lunar cal requirement)	<ul style="list-style-type: none"> - Clarify pointing time interval versus orbit altitude and inclination
Temporal	Calibrate at equatorial-to-polar latitudes every 3 months	<ul style="list-style-type: none"> - 1 vs 2 satellite sampling to meet sampling requirements
Orbit	Nominally 600 km	Linked to pointing capability study
Sampling Coverage	Ability to account for changing instrument spectral response in climate data records	<ul style="list-style-type: none"> - Clarify according to sampling requirements vs cost
Collaborations	International ; Calibration of sensors on operational and research missions; Analysis of climate data records from instruments calibrated by CLARREO; Open data policy	<ul style="list-style-type: none"> - TRUTHS -- CEOS-GSICS

* Derived from the anisotropy of radiation fields (1-sigma)

Send any
comments/questions/contributions
norman.g.loeb@nasa.gov